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EGYPTIAN SNAKES OF THE GENUS *PSAMMOPHIS*

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Hitherto the number of forms of this genus in Egypt has been in question. Two forms variously considered as species or subspecies are known. The present study demonstrates that three distinct species exist in Egypt.

Psammophis schokari Forskal has been considered a distinct species by Parker (1949) and a subspecies of *Psammophis sibilans* Linnaeus by Loveridge (1940). Loveridge recorded both forms from the same localities in Egypt and suggested that a study of the populations from that area would be fruitful. The extensive collecting of the United States Naval Medical Research Unit No. 3 at Cairo, Egypt, has made available to Chicago Natural History Museum large series of *Psammophis* from Egypt, including specimens of both *sibilans* and *schokari* from the same localities. This paper is an attempt to determine whether two distinct species or a single highly variable species exists in Egypt.

In the process of this study it became evident that a population from the Siwa Oasis is a distinct species, which is described below.

All specimens not having letters preceding the numbers are in the collection of Chicago Natural History Museum. I wish to thank Dr. Doris Cochran, United States National Museum (USNM), and Mr. Arthur Loveridge, Museum of Comparative Zoology (MCZ), for the loan of material in their institutions. The photographs were taken by me.

ANALYSIS OF CHARACTERS

The large Egyptian sample of *Psammophis* is easily divisible into two groups on the basis of slenderness and coloration. Upon examination of other characters (Table A), further differences between the

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two groups appear. Table A contains the means and extremes of characters used in this study of these two forms. In order to test whether the differences observed in these Egyptian forms hold true where the two forms occur together, or if intergradation occurs, the sample with the most specimens from a single locality was analyzed (Table C). I have also analyzed all specimens from the very small Province of Giza (Table B) in order to obtain a statistically adequate number of snakes, believing that the area is sufficiently small to permit gene flow throughout, and thus define normal variation.

Psammophis s. sibilans and *P. schokari* show no significant specific differences in the following characters (Table A): (1) scale rows at mid-body, (2) division of anal plate, (3) number of infralabials, (4) number of infralabials in contact with anterior pair of chinshields, (5) number of preoculars, (6) number of postoculars, (7) arrangement of temporals, (8) rostral width in relation to height, and (9) length of tail in relation to total length.

Though there is much overlap in the number of ventrals in both sexes, *P. schokari* tends to have more ventrals than *s. sibilans* both throughout Egypt and in the restricted areas of Abu Rawash and throughout Giza Province. This is also true of subcaudals in males, and apparently so in females, though the number of females with complete tails is too small to be conclusive.

Although both forms may have 8 or 9 supralabials, 85 per cent of *s. sibilans* have 8 supralabials on both sides and 66 per cent of *schokari* have 9 on both sides. These proportions are even more emphasized by considering the specimens with 8 labials on one side and 9 on the other (Table A). The number of supralabials entering the orbit shows similar overlap. The combination may vary and include the fourth, fifth, sixth, or seventh supralabials; 85 per cent of Egyptian *sibilans* have the fourth and fifth entering the orbit, on both sides, whereas 66 per cent of *schokari* have the fifth and sixth entering the orbit on both sides.

At a casual glance it is easily seen that *sibilans* is a much thicker-bodied snake than *schokari*, and this is evident when body proportions are calculated. In both sexes *sibilans* is less slender than *schokari*. The proportional length of the tail is approximately the same in both forms (Table A).

The color pattern (figs. 30, 31) is useful in distinguishing these two forms in Egypt. *P. s. sibilans* (fig. 30, A) is characterized by vertical broad bars on the cheek region, a narrow mid-dorsal light stripe, a broad, dark, lateral band on the first three scale rows, and

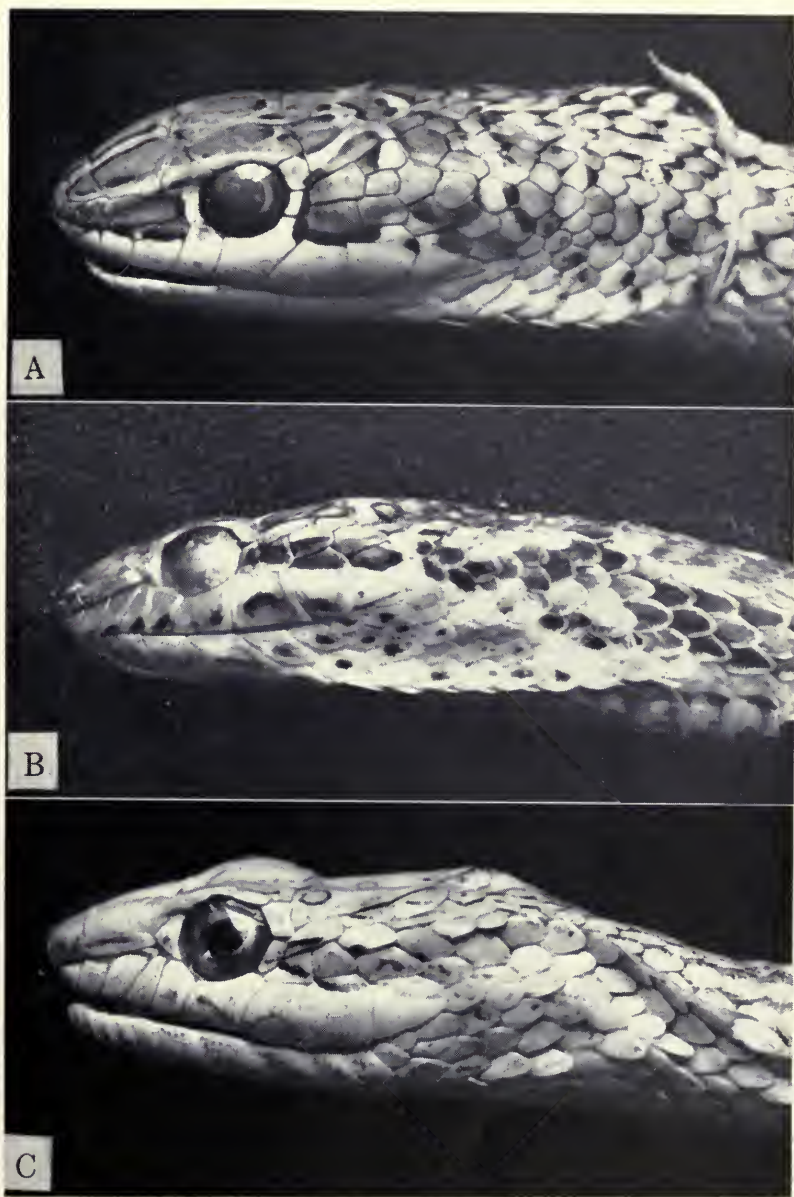


FIG. 30. Lateral view of heads. A, *Psammophis s. sibilans*, CNHM no. 63138. B, *P. schokari*, CNHM no. 66148. C, *P. aegyptius*, new sp., CNHM no. 65923 (paratype).

a yellowish belly (fig. 31, A). *P. schokari* (fig. 30, B) has a narrow longitudinal dark stripe running through the eye, a broad, black mid-ventral band, and a thin, broken black stripe near the edges of the ventrals (fig. 31, B). It usually lacks any bands on the dorsum.

P. s. sibilans may have a slightly more yellowish mid-ventral area outlined by irregularly dashed lines. This dark border need not be confused with the dark ventral stripes of *schokari*, for in *s. sibilans* the black lines are in the central third of the ventral plates.

Two specimens of *schokari* have the light mid-dorsal stripe and a dark lateral band but no other color characteristics of *sibilans*. The dark lateral band is also distinctly narrower in these two specimens, covering only 2 scale rows. Nineteen specimens of *schokari* have either the mid-dorsal stripe or the lateral band but no other characteristics of *s. sibilans*. Six specimens that lack the mid-dorsal stripe and lateral band typical of *sibilans* in Egypt otherwise agree with Egyptian *sibilans* and do not represent hybrids of intermediates between *s. sibilans* and *schokari*.

It is evident that in Egypt there are two distinct species that differ in scutellation, body proportions, size, and pattern, although these characters have extensive overlapping ranges of variation. These differences occur throughout Egypt as well as at Abu Rawash, where populations of the two forms are found together.

***Psammophis aegyptius*, new species.** Figures 30, C; 31, C.

Type.—Chicago Natural History Museum no. 75092, male. Taken from a date grove near the government house at Siwa, Siwa Oasis, Western Desert Governorate, Egypt. Collected by Robert E. Kuntz and G. M. Malakatis.

Diagnosis.—A *Psammophis* with a stripe on the side of the head, running through the eye; belly finely punctulated; males with 188–199 ventrals and 17–19 scale rows at mid-body.

Description of type.—Rostral broader than deep, visible from above; snout $1\frac{1}{2}$ times the length of the eye; internasals one-half length of prefrontals; frontal as long as its distance from snout, slightly longer than parietals, and in the middle about two-thirds the width of the supraoculars; nostril between two shields; loreal $3\frac{1}{2}$ times as long as deep; one preocular, in contact with frontal; two postoculars; two anterior temporals; three posterior temporals on the right side and two posterior temporals on the left side; upper

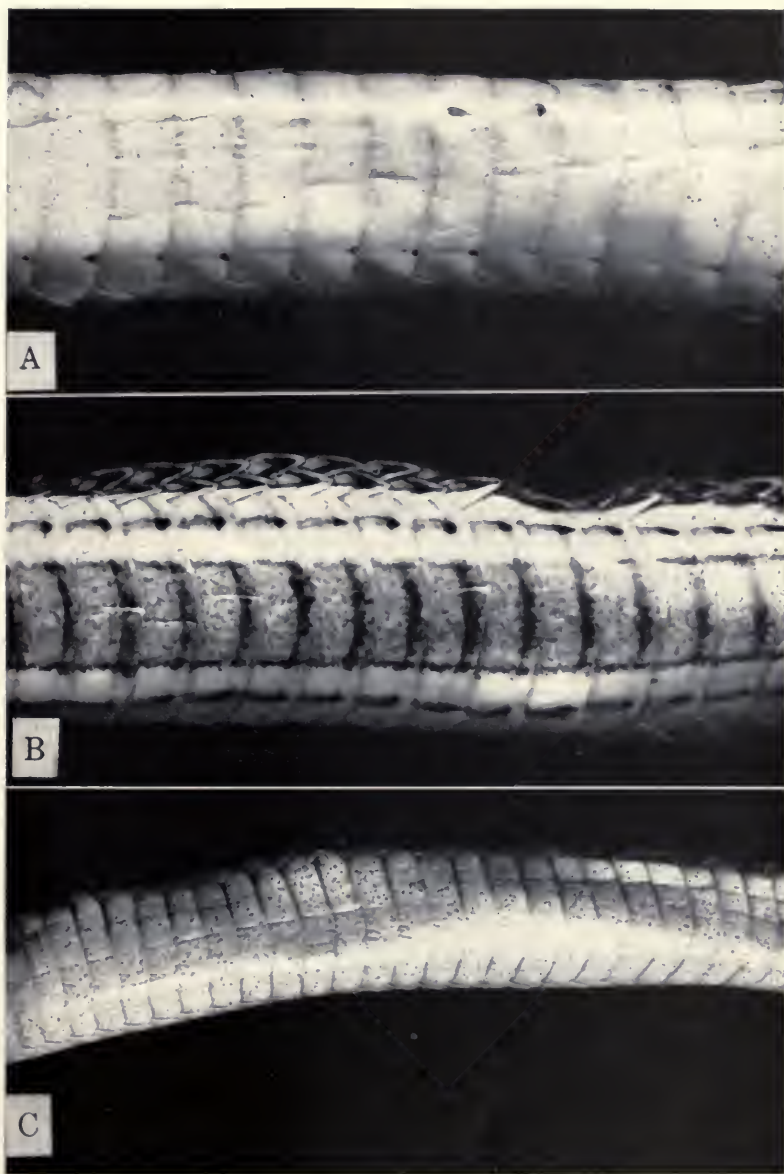


FIG. 31. Ventral color patterns. A, *Psammophis s. sibilans*, CNHM no. 63138. B, *P. schokari*, CNHM no. 66148. C, *P. aegyptius*, new sp., CNHM no. 65923 (paratype).

TABLE A.—VARIATION OF EGYPTIAN *Psammophis*

	<i>P. s. sibilans</i>	<i>P. schokari</i>	<i>P. aegyptius</i>
Scale rows at mid-body	17 (52)	17 (41)	19 (4); 17 (1)
Ventrals, ♂	159-172 [163.4] (37)	163-179 [171.3] (35)	188-199 [193.4] (5)
Ventrals, ♀	162-171 [166.9] (15)	170-177 [173.0] (5)	...
Subcaudals, ♂	100-117 [106.7] (27)	109-121 [115.2] (28)	115-122 [117.75] (4)
Subcaudals, ♀	103-115 [111.1] (8)	112-117 [115.0] (3)	...
Anal plate	divided (52)	divided (38); entire (1)	divided (5)
Supralabials	8 (44); 9 (3); 8/9 (5)	8 (4); 9 (27); 8/9 (9); 10 (1)	9 (4); 10 (1)
Supralabials entering orbit	4-5 (44); 4-5/5-6 (6); 5-6 (2)	4-5 (4); 4-5/5-6 (9); 5-6 (27); 6-7 (1)	5-6 (4); 6-7 (1)
Infralabials	10 (1); 10/11 (3); 11 (45); 11/12 (1); 12 (1)	9 (1); 10/11 (16); 11 (22); 11/12 (1)	12 (1); 12/13 (1); 13 (2); 11/14 (1)
Infralabials in contact with first pair of chinshields	4 (13); 4/5 (7); 5 (32)	4 (5); 4/5 (5); 5 (28)	5 (1); 5/6 (2); 6 (1); 6/7 (1)
Preoculars	1 (49); 1/2 (1); 2 (2)	1 (40); 2 (1)	1 (5)
Preoculars in contact with frontal	yes (29); no (20); one side (3)	yes (40)	yes (5)
Postoculars	2 (46); 2/3 (5); 3 (1)	2 (38); 2/3 (2); 3 (1)	2 (4); 2/3 (1)
Anterior temporals	2 (52)	2 (38); 3 (1); 2/1 (1)	2 (5)
Posterior temporals	2 (16); 2/3 (20); 3 (15); 3/4 (1)	2 (7); 2/3 (14); 3 (19)	2 (1); 2/3 (2); 3 (2)
Rostral wider than high	yes (50)	yes (39)	yes (5)

TABLE A (continued).—VARIATION OF EGYPTIAN *Psammophis*

	<i>P. s. sibilans</i>	<i>P. schokari</i>	<i>P. aegyptius</i>
Body length (largest ♂)	708-982 [769] (10)	614-737 [664] (10)	382-856 [620.8] (5)
Body length (largest ♀)	516-737 [625] (10)	443-600 [513] (5)	...
Tail length Total length	0.31-0.34 [0.32] (32)	0.31-0.34 [0.33] (28)	0.28-0.30 [0.293] (4)
Tail length Total length	0.31-0.33 [0.325] (8)	0.33 [0.33] (3)	...
Mid-body width Body length	0.016-0.029 [0.023] (37)	0.013-0.026 [0.018] (34)	0.015-0.022 [0.018] (5)
Mid-body width Body length	0.018-0.030 [0.023] (15)	0.017-0.022 [0.019] (5)	...
Lateral stripe through eye	absent (51)	present (35)	present (5)
Mid-dorsal stripe	present (45); absent (6)	present (10); absent (24)	absent (5)
Lateral band	present (45); absent (6)	present (11); absent (25)	absent (5)
Black, mid-ventral band	absent (51)	present (35)	absent (5)
Black stripe near edge of ventrals	present (1); absent (50)	present (35)	absent (5)

Numbers in parentheses are numbers of specimens. Measurements are in millimeters.

Means are in brackets.

The diagonal line separates counts of scales on the two sides of the head.

labials 9, fifth and sixth entering the orbit; lower labials 12, first five on the right side and first six on the left side in contact with the anterior pair of chinshields; anterior pair of chinshields shorter than posterior pair.

Mid-body scale rows 19; ventrals 188; anal divided; subcaudals 115. Total length 1183 mm., tail 0.28 of total.

Color (in alcohol): Faint markings on head; a dark narrow longitudinal band running from snout, through eye, onto cheeks. Dorsum light tan. Belly same as dorsum and having very tiny dark dots.

Paratypes.—CNHM no. 75091, collected with the type. CNHM nos. 65922–23, from the same locality as the type; collected by Harry Hoogstraal, March 31, 1951. CNHM no. 72065, collected at the airport, Luxor, Qena Province, Egypt, by Harry Hoogstraal, April 10, 1953.

CNHM no. 65922 was taken on the desert near palm groves and 65923 was taken in a sandy, fallow field.

The Luxor specimen lacks the finely punctulated dots on its white belly.

For intraspecific variation in *Psammophis* see Table A.

Comparisons.—This new form differs from *Psammophis s. sibilans* and *P. schokari* of Egypt (Table A) in the greater number of ventrals, higher number of scale rows at mid-body, number of infralabials, finely punctulated belly, and slightly shorter tail.

In addition, it differs from *Psammophis s. sibilans* in number of subcaudals, number of supralabials, and number of supralabials entering the orbit, in having the preocular always in contact with the frontal, and in over-all color pattern.

MATERIAL EXAMINED

Psammophis s. sibilans Linnaeus

Gharbiya Province: Talkha (72057); Shirbin, Kafr el Battikn (72056).

Beheira Province: Kom Hamada, El Khatatba (72050–55).

Giza Province: Imbaba, Abu Rawash (63138–39, 64012, 64014, 66147, 66149–51, 72077, 75551, 75985–87, 75989–90); Imbaba, El Mansuriya (68828, 72046, 72059); Imbaba, Kafr Hakim (75544); Imbaba, Abu Ghalib (68829); Imbaba, Birgash (72058, 72064); Imbaba, Minshat el Bakkari (72047); Giza, El Talbiya (72067–68); El Aiyat, Sakkara (72040–45); El Aiyat, El Aiyat (72048–49); 4 km. west of Cairo (72069–73).

Faiyum Province: Seila (64010); Sinnuris, Minshat Tantawi (75988).

Beni Suef Province: Beni Suef (64011).

Western Desert Governorate: Wadi Natrun (64013); Mariut, El Amiriya (72060-61).

Total number of specimens: 52.

***Psammophis schokari* Forskal**

Sinai Governorate: Wadi Feiran (MCZ 9691, USNM 131438).

Sharqiya Province: Abu Hammad, Abu Siweir (72066).

Giza Province: Imbaba, Abu Rawash (64008, 66148, 68827, 72078, 75093-94); 4 miles northwest of Abu Rawash (63143-44); Imbaba, El Mansuriya (72076); El Aiyat, Sakkara (63140-41, 64006-07, 63015-16); El Aiyat, El Aiyat (64009); Giza Pyramid (75550).

Cairo Province: Maadi (68826).

Faiyum Province: Kom O Shim (72074).

Eastern Desert Governorate: Wadi el Nasuri (69263); Wadi Ghaweibba (75549).

Western Desert Governorate: Mariut, El Amiriya (63142, 72062-63); 2 miles northwest of Sidi Barrani (75989); 30 miles east of Salum (75984); Mariut, Burg el Arab (64017, 72075, 75090-91, 75545-48); El Daba (68825); Mersa Matruh (69264); 17 km. west of Rosetta (69265); Salum, Libyan Plateau, Bir Bosslanga (75983).

Total number of specimens: 41.

***Psammophis aegyptius*, new species**

Western Desert Governorate: Siwa Oasis, Siwa (65922-23, 75091-92).

Qena Province: Luxor (72065).

Total number of specimens: 5.

TABLE B.—VARIATION OF CERTAIN CHARACTERS OF *Psammophis* s. *sibilans* AND *P. schokari* FROM GIZA PROVINCE

	<i>P. s. sibilans</i>	<i>P. schokari</i>
Ventrals, ♂	159-172 [164.0] (24)	167-177 [170.8] (13)
Ventrals, ♀	162-171 [167.25] (12)	170-176 [172.0] (4)
Subcaudals, ♂	100-116 [106.3] (20)	109-118 [114.3] (12)
Subcaudals, ♀	103-114 [110.2] (5)	112-117 [114.5] (2)
Supralabials, ♂	8 (24); 8/9 (1); 9 (1)	8 (3); 8/9 (5); 9 (5)
Supralabials, ♀	8 (6); 8/9 (5); 9 (1)	8 (1); 8/9 (1); 9 (2)
Supralabials entering eye	4-5 (30); 4-5/5-6 (6); 5-6 (2)	4-5 (4); 4-5/5-6 (6); 5-6 (7)
Preoculars in contact with frontal	yes (22); no (14); one side (2)	yes (17)
Mid-body width		
Body length ♂	0.017-0.028 [0.0231] (26)	0.014-0.020 [0.0174] (13)
Mid-body width		
Body length ♀	0.019-0.030 [0.0231] (12)	0.017-0.022 [0.0190] (4)

TABLE C.—VARIATION OF CERTAIN CHARACTERS OF *Psammophis s. sibilans* and *P. schokari* FROM ABU RAWASH, GIZA PROVINCE

	<i>P. s. sibilans</i>	<i>P. schokari</i>
Ventrals, ♂	160–171 [165.0] (11)	167–174 [170.2] (6)
Ventrals, ♀	166–168 [167.0] (4)	170–172 [171.0] (2)
Subcaudals, ♂	100–116 [105.3] (8)	112–117 [114.4] (5)
Subcaudals, ♀	112 (1)	112–117 [114.5] (2)
Supralabials, ♂	8 (10); 8/9 (1)	8 (1); 8/9 (2); 9 (3)
Supralabials, ♀	8 (2); 8/9 (2)	8/9 (1); 9 (1)
Supralabials entering orbit	4–5 (12); 4–5/5–6 (3)	4–5 (1); 4–5/5–6 (3); 5–6 (4)
Preoculars in contact with frontal	yes (9); no (4); one side (2)	yes (8)
<u>Mid-body width</u> ♂		
Body length	0.017–0.028 [0.0218] (11)	0.015–0.020 [0.0170] (6)
<u>Mid-body width</u> ♀		
Body length	0.019–0.025 [0.0230] (4)	0.017–0.022 [0.0195] (2)

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